

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty) (PCT Article 36 and Rule 70)

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Applicant's or agent's file reference CFO17975WO	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT / JP2004/004072	International filing date (day/month/year) 24.03.2004	Priority date (day/month/year) 26.03.2003	
International Patent Classification (IPC) or national classification and IPC Int.Cl. <sup>7</sup> H01L 31/06			

Applicant  
CANON KABUSHIKI KAISHA

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

a.  a total of 1 sheets, as follows:

sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

b.  a total of (indicate type and number of electronic carrier(s)) \_\_\_\_\_ containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

Box No. I Basis of the report

Box No. II Priority

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Box No. IV Lack of unity of invention

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Box No. VI Certain documents cited

Box No. VII Certain defects in the international application

Box No. VIII Certain observations on the international application

Date of submission of the demand 19.10.2004	Date of completion of this report 16.08.2005
Name and mailing address of the IPEA/JP <b>Japan Patent Office</b> 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer 2K 9207
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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2004/004072

## Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

This report is based on translations from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of:

- international search (under Rules 12.3 and 23.1(b))
- publication of the international application (under Rule 12.4)
- international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

the international application as originally filed/furnished

the description:

pages 1-48 \_\_\_\_\_ as originally filed/furnished  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

the claims:

pages 2-4 \_\_\_\_\_ as originally filed/furnished  
 pages\* \_\_\_\_\_ as amended (together with any statement) under Article 19  
 pages\* 1 \_\_\_\_\_ received by this Authority on 19.10.2004  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

the drawings:

pages 1-6 \_\_\_\_\_ as originally filed/furnished  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_  
 pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3.  The amendments have resulted in the cancellation of:

the description, pages \_\_\_\_\_  
 the claims, Nos. \_\_\_\_\_  
 the drawings, sheets/figs \_\_\_\_\_  
 the sequence listing (specify): \_\_\_\_\_  
 any table(s) related to sequence listing (specify): \_\_\_\_\_

4.  This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

the description, pages \_\_\_\_\_  
 the claims, Nos. \_\_\_\_\_  
 the drawings, sheets/figs \_\_\_\_\_  
 the sequence listing (specify): \_\_\_\_\_  
 any table(s) related to sequence listing (specify): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## Box No. IV Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:
  - restricted the claims.
  - paid additional fees.
  - paid additional fees under protest.
  - neither restricted nor paid additional fees.
2.  This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is:
  - complied with.
  - not complied with for the following reasons:

Common technical features between two independent claims 1 and 4 in this application reside only in a polycrystalline silicon material (layer/substrate), and a layer having an amorphous silicon phase and microcrystalline silicon phase on the polycrystalline silicon material. The remaining features of claims 1 and 4 are not considered to involve the same technical meaning.

Furthermore, D1 (JP 2001-217442 A) discloses a solar cell having an n-type polycrystalline silicon layer (2) on a SUS substrate (1) (e.g. Fig 1), where the n-type polycrystalline silicon layer (2) could be replaced with a microcrystalline layer ([0010]), and a metal grade silicon substrate could be used in place of the SUS substrate (1) ([0014]), which substantially correspond to the common technical features above.

Therefore, claims 1-3 and 4 do not involve same or corresponding special technical features within the meaning of PCT Rule 13.2.

4. Consequently, this report has been established in respect of the following parts of the international application:

- all parts.
- the parts relating to claims Nos. \_\_\_\_\_

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/JP2004/004072

## Box No. V

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

## 1. Statement

Novelty (N)

Claims

1-4

YES

NO

Inventive step (IS)

Claims

1-4

YES

NO

Industrial applicability (IA)

Claims

1-4

YES

NO

## 2. Citations and explanations(Rule 70.7)

D1: JP 2001-217442 A (Hitachi Cable) 2001.08.10

(1) D1 discloses a solar cell having an n-type polycrystalline silicon layer (2) on a SUS substrate (1) (e.g. Fig.1), where the n-type polycrystalline silicon layer (2) could be replaced with a microcrystalline layer ([0010]), and a metal grade silicon substrate could be used in place of the SUS substrate (1) ([0014]).

(2) Regarding claims 1-3, although a polycrystalline silicon layer (2) in D1 is not a non-doped layer as claim 1, it is not clear from the description or other evidence what a technical meaning this difference of doping has. Each limitation by claims 2-3 is also considered to be merely a matter of design. Therefore, claims 1-3 are considered to be lack of inventive step over D1.

(3) Regarding claim 4, the term "grown with the microcrystalline silicon phase as a seed" in this claim does not limit this product claim. Therefore, claim 4 is also not considered to involve inventive step, since no clearly distinguishable technical features from D1 could be found.

## CLAIMS

1. (Amended) A solar cell comprising:  
a silicon substrate for a solar cell, the  
substrate comprising a base composed of a  
5 polycrystalline metal-grade silicon solidified in one  
direction and a high-purity polycrystalline silicon  
layer stacked on a surface of the base; and  
a non-doped layer stacked on the silicon  
substrate, the non-doped layer having an amorphous  
10 silicon phase and a microcrystalline silicon phase  
mixed together.
2. (Unchanged) A solar cell according to claim  
1, wherein a thickness of the layer having the non-  
doped amorphous silicon phase and the  
15 microcrystalline silicon phase mixed together ranges  
from 1 nm to 15 nm.
3. (Unchanged) A solar cell according to claim  
1 or 2, wherein a ratio of the amorphous silicon  
phase and the microcrystalline silicon phase in the  
20 layer having the non-doped amorphous silicon phase  
and the microcrystalline silicon phase mixed together  
ranges from 1:1 to 10:1.
4. (Unchanged) A solar cell comprising a  
crystalline silicon substrate or a crystalline  
25 silicon layer, a layer having an amorphous silicon  
phase and a microcrystalline silicon phase mixed  
together, and a polycrystalline silicon layer grown  
with the microcrystalline silicon phase as a seed,  
which are stacked in mentioned order.